AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1-3. (Canceled)

4. (Currently Amended) [[The]] A ring interconnection network system ~~according to claim 3, wherein,~~ having a plurality of ring networks which have a plurality of nodes and a transmission line connecting these nodes in a ring and a plurality of connection parts which connect the plurality of ring networks to each other, said ring interconnection network system comprising:

a first self-healing function which, when a failure has occurred in said ring networks, forms a shortest communication route to avoid the failure;

a second self-healing function which, when a failure has occurred in said connection parts, forms a communication route to avoid the failure, wherein said second self-healing function forms routes for transmitting the same signal in at least two of said plurality of connection parts beforehand and, when a failure has occurred in the connection parts, switches between these routes to form a communication route for avoiding said failure;

switching control means for causing said first self-healing function and said second self-healing function to function in cooperation with each other without contradiction;

a first and a second ring network each of which includes a plurality of nodes including a first and a second interconnection node and a transmission line connecting these nodes in a ring;

a first interconnection line which connects a first interconnection node of said first ring network and a first interconnection node of said second ring network to each other; and

a second interconnection line which connects a second interconnection node of said first ring network and a second interconnection node of said second ring network to each other,

wherein:

said second self-healing function gives the first interconnection nodes of said first and second ring networks the right of selecting traffic from either said transmission line or said interconnection line to form routes for transmitting the same signal in said first and second interconnection lines; and

in a case where a traffic switching request has occurred in a segment other than the segment between said first and second interconnection nodes in said first ring network and the place where the request has occurred relates to a path interconnecting said first and second ring networks,

said second self-healing function, when said first self-healing function has operated according to said request, transfers said right of selecting traffic from said first interconnection node to said second interconnection node in said first ring network.

5. (Currently Amended) [[The]] A ring interconnection network system ~~according to claim 3, wherein,~~ having a plurality of ring networks which have a plurality of nodes and a transmission line connecting these nodes in a ring and a plurality of connection parts which connect the plurality of ring networks to each other, said ring interconnection network system comprising:

a first self-healing function which, when a failure has occurred in said ring networks, forms a shortest communication route to avoid the failure;

a second self-healing function which, when a failure has occurred in said connection parts, forms a communication route to avoid the failure, wherein said second self-healing function forms routes for transmitting the same signal in at least two of said plurality of connection parts beforehand and, when a failure has occurred in the connection parts, switches between these routes to form a communication route for avoiding said failure;

switching control means for causing said first self-healing function and said second self-healing function to function in cooperation with each other without contradiction;

a first and a second ring network each of which includes a plurality of nodes including a first and a second interconnection node and a transmission line connecting these nodes in a ring;

a first interconnection line which connects a first interconnection node of said first ring network and a first interconnection node of said second ring network to each other; and

a second interconnection line which connects a second interconnection node of said first ring network and a second interconnection node of said second ring network to each other,

wherein:

said second self-healing function gives the first interconnection nodes of said first and second ring networks the right of selecting traffic from either said transmission line or said interconnection line to form routes for transmitting the same signal in said first and second interconnection lines; and

in a case where a traffic switching request has occurred in the segment between said first and second interconnection nodes in said first ring network and the place where the request has occurred relates to a path interconnecting said first and second ring networks,

said second self-healing function, when said first self-healing function has operated according to said request, transfers said right of selecting traffic from said first interconnection node to a node which terminates said path.

6. (Currently Amended) [[The]] A ring interconnection network system ~~according to claim 3, wherein,~~ having a plurality of ring networks which have a plurality of nodes and a transmission line connecting these nodes in a ring and a plurality of connection parts which connect the plurality of ring networks to each other, said ring interconnection network system comprising:

a first self-healing function which, when a failure has occurred in said ring networks, forms a shortest communication route to avoid the failure;

a second self-healing function which, when a failure has occurred in said connection parts, forms a communication route to avoid the failure, wherein said second self-healing function forms routes for transmitting the same signal in at least two of said plurality of connection parts beforehand and, when a failure has occurred in the connection parts, switches between these routes to form a communication route for avoiding said failure;

switching control means for causing said first self-healing function and said second self-healing function to function in cooperation with each other without contradiction;

a first and a second ring network each of which includes a plurality of nodes including a first and a second interconnection node and a transmission line connecting these nodes in a ring;

a first interconnection line which connects a first interconnection node of said first ring network and a first interconnection node of said second ring network to each other; and

a second interconnection line which connects a second interconnection node of said first ring network and a second interconnection node of said second ring network to each other,

wherein:

said second self-healing function gives the first interconnection nodes of said first and second ring networks the right of selecting traffic from either said transmission line or said interconnection line to form routes for transmitting the same signal in said first and second interconnection lines; and

in a case where traffic switching requests have occurred in a segment other than the segment between said first and second interconnection nodes and in said second interconnection line in said first ring network and the places where the requests have occurred relate to a path interconnecting said first and second ring networks,

said second self-healing function, when said first self-healing function has operated according to said requests, transfers said right of selecting traffic from said first interconnection node to said second interconnection node in said first ring network, and

the second interconnection node selects traffic from said first interconnection line.

7. (Canceled)

8. (Currently Amended) [[The]] A ring interconnection network system ~~according to claim 7, wherein,~~ having a plurality of ring networks which have a plurality of nodes and a transmission line connecting these nodes in a ring and a plurality of connection parts which connect the plurality of ring networks to each other, said ring interconnection network system comprising:

a first self-healing function which, when a failure has occurred in said ring networks, forms a shortest communication route to avoid the failure;

a second self-healing function which, when a failure has occurred in said connection parts, forms a communication route to avoid the failure, wherein said second self-healing function forms routes for transmitting the same signal in at least two of said

plurality of connection parts beforehand and, when a failure has occurred in the connection parts, switches between these routes to form a communication route for avoiding said failure;

switching control means for causing said first self-healing function and said second self-healing function to function in cooperation with each other without contradiction;

a first and a second ring network each of which includes a plurality of nodes including a first and a second interconnection node and a transmission line connecting these nodes in a ring;

a first interconnection line which connects a first interconnection node of said first ring network and a first interconnection node of said second ring network to each other; and

a second interconnection line which connects a second interconnection node of said first ring network and a second interconnection node of said second ring network to each other,

wherein:

said second self-healing function gives the first interconnection node of said first ring network and the second interconnection node of said second ring network the right of selecting traffic from either said transmission line or said interconnection line to form routes for transmitting the same signal in said first and second interconnection lines, and

in a case where a traffic switching request has occurred in a segment other than the segment between said first and second interconnection nodes in said first ring

network and the place where the request has occurred relates to a path interconnecting said first and second ring networks,

said second self-healing function, when said first self-healing function has operated according to said request, transfers said right of selecting traffic from said first interconnection node to said second interconnection node in said first ring network.

9. (Currently Amended) [[The]] A ring interconnection network system ~~according to claim 7, wherein,~~ having a plurality of ring networks which have a plurality of nodes and a transmission line connecting these nodes in a ring and a plurality of connection parts which connect the plurality of ring networks to each other, said ring interconnection network system comprising:

a first self-healing function which, when a failure has occurred in said ring networks, forms a shortest communication route to avoid the failure;

a second self-healing function which, when a failure has occurred in said connection parts, forms a communication route to avoid the failure, wherein said second self-healing function forms routes for transmitting the same signal in at least two of said plurality of connection parts beforehand and, when a failure has occurred in the connection parts, switches between these routes to form a communication route for avoiding said failure;

switching control means for causing said first self-healing function and said second self-healing function to function in cooperation with each other without contradiction;

a first and a second ring network each of which includes a plurality of nodes including a first and a second interconnection node and a transmission line connecting these nodes in a ring;

a first interconnection line which connects a first interconnection node of said first ring network and a first interconnection node of said second ring network to each other; and

a second interconnection line which connects a second interconnection node of said first ring network and a second interconnection node of said second ring network to each other,

wherein:

said second self-healing function gives the first interconnection node of said first ring network and the second interconnection node of said second ring network the right of selecting traffic from either said transmission line or said interconnection line to form routes for transmitting the same signal in said first and second interconnection lines, and

in a case where a traffic switching request has occurred in the segment between said first and second interconnection nodes in said first ring network and the place where the request has occurred relates to a path interconnecting said first and second ring networks,

said second self-healing function, when said first self-healing function has operated according to said request, transfers said right of selecting traffic from said first interconnection node to a node which terminates said path.

10-31. (Canceled)

32. (Currently Amended) [[The]] A ring interconnection network system ~~according to claim 31~~, comprising:

a first, a second, and a third ring network where a plurality of nodes are connected in a ring via a service line and a protection line;

a first interconnection line which connects a first interconnection node in the first ring network and a second interconnection node in the second ring network;

a second interconnection line which connects a third interconnection node adjacent to said first interconnection node in the first ring network and a fourth interconnection node adjacent said second interconnection node in the second ring network;

a third interconnection line which connects a fifth interconnection node adjacent to said third interconnection node in the first ring network and a sixth interconnection node adjacent said fourth interconnection node in the second ring network;

a fourth interconnection line which connects a seventh connection node in the second ring network and an eighth interconnection node in said third ring network;

a fifth interconnection line which connects a ninth interconnection node adjacent said seventh interconnection node in the second ring network and a tenth interconnection node adjacent to said eighth interconnection node in the third ring network; and

a sixth interconnection line which connects an eleventh interconnection node adjacent said ninth interconnection node in the second ring network and a twelfth

interconnection node adjacent to said tenth interconnection node in the third ring network, wherein

in a case where a communication path extending from said first ring network, passing through said second ring network, and reaching said third ring network is set,

when the communication path passes the segment between said first ring network and said second ring network, the path is caused to pass through at least two of said first to third interconnection lines, and

when the communication path passes the segment between said second ring network and said third ring network, the path is caused to pass through at least two of said fourth to sixth interconnection lines,

wherein, when failures have occurred in the service line and protection line between said fourth interconnection node and sixth interconnection node, any one of said seventh, ninth, and eleventh interconnection nodes sets the route of said communication path again for said sixth interconnection node via the protection line opposite the fault segment.

33. (Currently Amended) [[The]] A ring interconnection network system ~~according to claim 31~~, comprising:

a first, a second, and a third ring network where a plurality of nodes are connected in a ring via a service line and a protection line;

a first interconnection line which connects a first interconnection node in the first ring network and a second interconnection node in the second ring network;

a second interconnection line which connects a third interconnection node adjacent to said first interconnection node in the first ring network and a fourth interconnection node adjacent said second interconnection node in the second ring network;

a third interconnection line which connects a fifth interconnection node adjacent to said third interconnection node in the first ring network and a sixth interconnection node adjacent said fourth interconnection node in the second ring network;

a fourth interconnection line which connects a seventh connection node in the second ring network and an eighth interconnection node in said third ring network;

a fifth interconnection line which connects a ninth interconnection node adjacent said seventh interconnection node in the second ring network and a tenth interconnection node adjacent to said eighth interconnection node in the third ring network; and

a sixth interconnection line which connects an eleventh interconnection node adjacent said ninth interconnection node in the second ring network and a twelfth interconnection node adjacent to said tenth interconnection node in the third ring network, wherein

in a case where a communication path extending from said first ring network, passing through said second ring network, and reaching said third ring network is set,

when the communication path passes the segment between said first ring network and said second ring network, the path is caused to pass through at least two of said first to third interconnection lines, and

when the communication path passes the segment between said second ring network and said third ring network, the path is caused to pass through at least two of said fourth to sixth interconnection lines,

wherein, when failures have occurred in the service line and protection line between said second interconnection node and seventh interconnection node, any one of said fourth, sixth, ninth, and eleventh interconnection nodes sets the route of said communication path again for said second interconnection node and said seventh interconnection node via the protection line opposite the fault segment.

34. (Currently Amended) [[The]] A ring interconnection network system ~~according to claim 31~~, comprising:

a first, a second, and a third ring network where a plurality of nodes are connected in a ring via a service line and a protection line;

a first interconnection line which connects a first interconnection node in the first ring network and a second interconnection node in the second ring network;

a second interconnection line which connects a third interconnection node adjacent to said first interconnection node in the first ring network and a fourth interconnection node adjacent said second interconnection node in the second ring network;

a third interconnection line which connects a fifth interconnection node adjacent to said third interconnection node in the first ring network and a sixth interconnection node adjacent said fourth interconnection node in the second ring network;

a fourth interconnection line which connects a seventh connection node in the second ring network and an eighth interconnection node in said third ring network;

a fifth interconnection line which connects a ninth interconnection node adjacent said seventh interconnection node in the second ring network and a tenth interconnection node adjacent to said eighth interconnection node in the third ring network; and

a sixth interconnection line which connects an eleventh interconnection node adjacent said ninth interconnection node in the second ring network and a twelfth interconnection node adjacent to said tenth interconnection node in the third ring network, wherein

in a case where a communication path extending from said first ring network, passing through said second ring network, and reaching said third ring network is set,

when the communication path passes the segment between said first ring network and said second ring network, the path is caused to pass through at least two of said first to third interconnection lines, and

when the communication path passes the segment between said second ring network and said third ring network, the path is caused to pass through at least two of said fourth to sixth interconnection lines,

wherein, when failures have occurred in the service line and protection line between said ninth interconnection node and eleventh interconnection node, any one of said second, fourth, and sixth interconnection nodes sets the route of said communication path again for said eleventh interconnection node via the protection line opposite to the fault segment.

35. (Currently Amended) [[The]] A ring interconnection network system ~~according to claim 31~~, comprising:

a first, a second, and a third ring network where a plurality of nodes are connected in a ring via a service line and a protection line;

a first interconnection line which connects a first interconnection node in the first ring network and a second interconnection node in the second ring network;

a second interconnection line which connects a third interconnection node adjacent to said first interconnection node in the first ring network and a fourth interconnection node adjacent said second interconnection node in the second ring network;

a third interconnection line which connects a fifth interconnection node adjacent to said third interconnection node in the first ring network and a sixth interconnection node adjacent said fourth interconnection node in the second ring network;

a fourth interconnection line which connects a seventh connection node in the second ring network and an eighth interconnection node in said third ring network;

a fifth interconnection line which connects a ninth interconnection node adjacent said seventh interconnection node in the second ring network and a tenth interconnection node adjacent to said eighth interconnection node in the third ring network; and

a sixth interconnection line which connects an eleventh interconnection node adjacent said ninth interconnection node in the second ring network and a twelfth

interconnection node adjacent to said tenth interconnection node in the third ring network, wherein

in a case where a communication path extending from said first ring network, passing through said second ring network, and reaching said third ring network is set,

when the communication path passes the segment between said first ring network and said second ring network, the path is caused to pass through at least two of said first to third interconnection lines, and

when the communication path passes the segment between said second ring network and said third ring network, the path is caused to pass through at least two of said fourth to sixth interconnection lines,

wherein, when failures have occurred in the service line and protection line between said second interconnection node and seventh interconnection node and in the service line and protection line between said eleventh interconnection node and sixth interconnection node, the route of said communication path is not set again.

36. (Currently Amended) [[The]] A ring interconnection network system ~~according to claim 31~~, comprising:

a first, a second, and a third ring network where a plurality of nodes are connected in a ring via a service line and a protection line;

a first interconnection line which connects a first interconnection node in the first ring network and a second interconnection node in the second ring network;

a second interconnection line which connects a third interconnection node adjacent to said first interconnection node in the first ring network and a fourth

interconnection node adjacent said second interconnection node in the second ring network;

a third interconnection line which connects a fifth interconnection node adjacent to said third interconnection node in the first ring network and a sixth interconnection node adjacent said fourth interconnection node in the second ring network;

a fourth interconnection line which connects a seventh connection node in the second ring network and an eighth interconnection node in said third ring network;

a fifth interconnection line which connects a ninth interconnection node adjacent said seventh interconnection node in the second ring network and a tenth interconnection node adjacent to said eighth interconnection node in the third ring network; and

a sixth interconnection line which connects an eleventh interconnection node adjacent said ninth interconnection node in the second ring network and a twelfth interconnection node adjacent to said tenth interconnection node in the third ring network, wherein

in a case where a communication path extending from said first ring network, passing through said second ring network, and reaching said third ring network is set,

when the communication path passes the segment between said first ring network and said second ring network, the path is caused to pass through at least two of said first to third interconnection lines, and

when the communication path passes the segment between said second ring network and said third ring network, the path is caused to pass through at least two of said fourth to sixth interconnection lines,

wherein, when failures have occurred in the service line and protection line between said second interconnection node and fourth interconnection node, any one of said sixth, ninth, and eleventh interconnection nodes sets the route of said communication path again for said fourth interconnection node and said seventh interconnection node via the protection line opposite to the fault segment.

37. (Currently Amended) [[The]] A ring interconnection network system ~~according to claim 31~~, comprising:

a first, a second, and a third ring network where a plurality of nodes are connected in a ring via a service line and a protection line;

a first interconnection line which connects a first interconnection node in the first ring network and a second interconnection node in the second ring network;

a second interconnection line which connects a third interconnection node adjacent to said first interconnection node in the first ring network and a fourth interconnection node adjacent said second interconnection node in the second ring network;

a third interconnection line which connects a fifth interconnection node adjacent to said third interconnection node in the first ring network and a sixth interconnection node adjacent said fourth interconnection node in the second ring network;

a fourth interconnection line which connects a seventh connection node in the second ring network and an eighth interconnection node in said third ring network;

a fifth interconnection line which connects a ninth interconnection node adjacent said seventh interconnection node in the second ring network and a tenth

interconnection node adjacent to said eighth interconnection node in the third ring network; and

a sixth interconnection line which connects an eleventh interconnection node adjacent said ninth interconnection node in the second ring network and a twelfth interconnection node adjacent to said tenth interconnection node in the third ring network, wherein

in a case where a communication path extending from said first ring network, passing through said second ring network, and reaching said third ring network is set,

when the communication path passes the segment between said first ring network and said second ring network, the path is caused to pass through at least two of said first to third interconnection lines, and

when the communication path passes the segment between said second ring network and said third ring network, the path is caused to pass through at least two of said fourth to sixth interconnection lines,

wherein, when failures have occurred in the service line and protection line between said seventh interconnection node and ninth interconnection node, any one of said fourth, sixth, and eleventh interconnection nodes sets the route of said communication path again for said second interconnection node and said ninth interconnection node via the protection line opposite the fault segment.